

WHAT IS CLAIMED

1. A method of conducting communications between respective transceivers of a communication network using a selected portion of a prescribed communication bandwidth containing a plurality of sub-bandwidth channels, said method comprising the steps of:

(a) monitoring said prescribed communication bandwidth for the presence of communication activity on said sub-bandwidth communication channels, and identifying those ones of said sub-bandwidth communication channels which are absent communication activity as clear channels available for use by said respective transceivers; and

(b) causing said respective transceivers to conduct communications therebetween using selected ones of said clear channels identified in step (a).

2. The method according to claim 1, wherein step (b) comprises causing said transceivers to conduct communications therebetween by sequentially using respectively different ones of said selected ones of said clear channels identified in step (a).

3. The method according to claim 1, wherein said communication network contains a master site transceiver and a plurality of remote site transceivers, and wherein communications within said network are between said master site transceiver and said remote site transceivers.

4. The method according to claim 3, wherein step (a) comprises the steps of:

(a1) causing said master site transceiver to transmit a prescribed message that is detectable by each of said remote site transceivers and, in response to said prescribed message, causing each remote site transceiver to monitor said prescribed communication bandwidth for effective communication activity on said sub-bandwidth communication channels, and to identify which of said sub-bandwidth communication channels appear to said each remote site transceiver to be absent effective communication activity and thereby constitute clear channels available for use,

(a2) causing each remote site transceiver to transmit to said master site transceiver a message identifying clear channels identified thereby in step (a1), and

(a3) causing said master site transceiver to broadcast to each of said remote site transceivers a communication control message containing an aggregate identification of clear channels based upon clear channel identifying messages transmitted by said remote site transceivers to said master site transceiver in step (a2).

5. The method according to claim 4, wherein step (a1) comprises causing said master site transceiver to transmit a predetermined preamble as part of said

prescribed message, said predetermined preamble being monitored by each of said remote site transceivers and, in response to said predetermined preamble, causing each remote site transceiver to monitor said prescribed communication bandwidth for effective communication activity on said sub-bandwidth communication channels, and to identify which of said sub-bandwidth communication channels appear to said each remote site transceiver to be absent effective communication activity and thereby constitute clear channels available for use,

6. The method according to claim 4, wherein said communication control message broadcast by said master site transceiver contains information representative of a sequence of respectively different ones of said clear channels as broadcast in step (a3) that are to be sequentially employed for conveying messages between said master site transceiver and said remote site transceivers.

7. The method according to claim 1, wherein step (b) comprises coupling identifications of said selected ones of said clear channels identified in step (a) to a modulated filter bank containing an inverse fast Fourier transform operator and a polyphase filter, and deriving therefrom a plurality of carrier frequencies respectively corresponding to said selected ones of said clear channels.

8. The method according to claim 7, wherein step (b) comprises causing said transceivers to conduct communications therebetween by using differential quadrature phase shift keying modulation of sequential ones of respectively different ones of said clear channels identified in step (a).

9. The method according to claim 1, wherein said prescribed communication bandwidth is the 217 to 220 MHz band, and wherein a respective sub-bandwidth channel is a 6.25 Khz wide channel.

10. A system for conducting communications between respective sites of a communication network using a selected portion of a prescribed communication bandwidth containing a plurality of sub-bandwidth channels, said system comprising:

a master site transceiver and a plurality of remote site transceivers, each remote site transceiver being operative to monitor said prescribed communication bandwidth for the presence of communication activity on said sub-bandwidth communication channels, and to inform said master site transceiver which of said sub-bandwidth communication channels are absent communication activity and therefore constitute clear channels available for use by said communication system;

said master site transceiver being operative to compile an aggregate list of clear channels identified

by said plurality of remote site transceivers and to transmit a message to said plurality of remote site transceivers containing information representative of said aggregate list of clear channels; and wherein

said master site transceiver and a remote site transceiver are operative to conduct communications therebetween using selected ones of said clear channels contained in said aggregate list.

11. The system according to claim 10, wherein said master site transceiver and said remote site transceiver are operative to conduct communications therebetween by sequentially using respectively different ones of said selected ones of said clear channels contained in said aggregate list.

12. The system according to claim 11, wherein said master site transceiver is operative to transmit a message that is detectable by each of said remote site transceivers and wherein, in response to said message, each remote site transceiver is operative to monitor said prescribed communication bandwidth for effective communication activity on said sub-bandwidth communication channels, and to identify which of said sub-bandwidth communication channels appear to said each remote site transceiver to be absent effective communication activity and thereby constitute said clear channels available for use.

13. The system according to claim 10, wherein each of said master site transceiver and said remote site transceiver is operative to couple identifications of said selected ones of said clear channels to a modulated filter bank containing an inverse fast Fourier transform operator and a polyphase filter, so as to derive therefrom a plurality of carrier frequencies respectively corresponding to said selected ones of said clear channels.

14. The system according to claim 10, wherein said master site transceiver and said remote site transceiver are operative to conduct communications therebetween using differential quadrature phase shift keying modulation of sequential ones of respectively different ones of said clear channels.

15. The system according to claim 10, wherein said prescribed communication bandwidth is the 217 to 220 MHz band, and wherein a respective sub-bandwidth channel is a 6.25 KHz wide channel.

16. A method of conducting communications between transceivers of a communication network, using a selected portion of a prescribed communication bandwidth containing a plurality of sub-bandwidth channels, said method comprising the steps of:

(a) at a master site transceiver, transmitting a clear channel assessment message that is detectable by each of remote site transceivers;

(b) at each remote site transceiver, receiving said clear channel assessment message and, in response thereto, scanning said prescribed communication bandwidth for effective communication activity on said sub-bandwidth communication channels, and identifying which of said sub-bandwidth communication channels appear to said each remote site transceiver to be absent effective communication activity and thereby constitute clear channels available for use;

(c) at each remote site transceiver, transmitting a message to said master site transceiver containing information from which said clear channels may be identified at said master site transceiver;

(d) at said master site transceiver receiving messages transmitted from remote sites in step (c), compiling an aggregate list of clear channels as identified in said received messages, and transmitting to each remote site transceiver a clear channel usage message representative of said aggregate list; and

(e) causing said master site and a remote site transceiver to conduct communications therebetween using selected ones of said clear channels of said aggregate list.

17. The method according to claim 16, wherein step (e) comprises causing said master site transceiver and

said remote site transceiver to conduct communications therebetween by sequentially using respectively different ones of said selected ones of said clear channels of said aggregate list.

18. The method according to claim 17, wherein said clear channel usage message transmitted by said master site transceiver contains information representative of a sequence of respectively different ones of said clear channels that are to be sequentially used for conveying messages between said master site transceiver and said remote site transceiver.

19. The method according to claim 16, wherein step (d) comprises coupling identifications of said selected ones of said clear channels identified to a modulated filter bank containing an inverse fast Fourier transform operator and a polyphase filter, and deriving therefrom a plurality of carrier frequencies respectively corresponding to said selected ones of said clear channels.

20. The method according to claim 16, further comprising the step (f) of conducting a prescribed message exchange between said master site transceiver and a remote site desiring to join said communication network, in order to enable said remote site desiring to join said communication network to participate with said master site in steps (a) - (e).

21. The method according to claim 20, wherein step (f) comprises:

(f1) transmitting, from said master site transceiver, a beacon preamble message containing a clear channel and a unique word exclusively associated with said beacon preamble message;

(f2) at said remote site transceiver desiring to join said communication network, in response to detection of said beacon preamble message, transmitting a pure carrier signal corresponding to the clear channel contained in said beacon preamble message transmitted from said master site in step (a); and

(f3) at said master site transceiver, in response to detecting said pure carrier signal transmitted by said remote site transceiver desiring to join said communication network in step (f2), transmitting an initialization message containing said clear channel, a unique word exclusively associated with said initialization message, and initialization information that will enable said remote site desiring to join said communication network to join said communication network.

22. The method according to claim 16, wherein step (e) comprises the steps of:

(e1) broadcasting, from said master site transceiver, a media open message comprised of a prescribed plurality of clear channel frequencies;

(e2) at a remote site transceiver having information to be transmitted to said master site transceiver, in response to detecting said media open message broadcast from said master site transceiver in step (e1), and after expiration of a random delay interval, transmitting an access request message containing a predetermined plurality of clear channel frequencies different from said prescribed plurality of clear channel frequencies;

(e3) at said master site transceiver, in response to receipt of an access request message, broadcasting an access grant message containing a predefined number of clear channel frequencies different from said prescribed plurality and predetermined plurality of clear channel frequencies;

(e4) at said remote site transceiver having information to be transmitted to said master site transceiver, in response to detecting said access grant message broadcast from said master site transceiver in step (e1), transmitting a data message containing said information.

23. The method according to claim 16, wherein step (e) comprises the steps of:

(e1) broadcasting, from said master site transceiver, a media access message comprised of a prescribed plurality of clear channel frequencies;

(e1) broadcasting, from said master site transceiver, a data message containing information intended for a remote site transceiver

(e2) at said remote site transceiver, in response to detecting said media access message broadcast from said master site transceiver in step (e1), monitoring said communication network and receiving said data message broadcast from said master site transceiver in step (e1).

24. A method of conducting communications between respective unlicensed transceivers of a communication network using a selected portion of a communication bandwidth containing a plurality of licensed sub-bandwidth channels, said method comprising the steps of:

(a) monitoring said communication bandwidth for the presence of communication activity by licensed users on said licensed sub-bandwidth communication channels, and identifying those ones of said licensed sub-bandwidth communication channels which are absent communication activity by licensed users as clear channels available for use by said respective unlicensed transceivers; and

(b) causing said respective unlicensed transceivers to conduct communications therebetween using selected ones of said clear channels identified in step (a).

25. The method according to claim 24, wherein said communication network contains an unlicensed master site transceiver and a plurality of unlicensed remote site transceivers, and wherein communications within said network are between said unlicensed master site transceiver and said unlicensed remote site transceivers.

26. The method according to claim 25, wherein step (a) comprises the steps of:

(a1) causing said unlicensed master site transceiver to transmit a prescribed message that is detectable by each of said unlicensed remote site transceivers and, in response to said prescribed message, causing each unlicensed remote site transceiver to monitor said prescribed communication bandwidth for effective communication activity by licensed users on said sub-bandwidth communication channels, and to identify which of said sub-bandwidth communication channels appear to said each remote site transceiver to be absent effective communication activity by licensed users thereof, and thereby constitute clear channels available for use,

(a2) causing each unlicensed remote site transceiver to transmit to said unlicensed master site transceiver a message identifying clear channels identified thereby in step (a1), and

(a3) causing said unlicensed master site transceiver to broadcast to each of said unlicensed

remote site transceivers a communication control message containing an aggregate identification of clear channels based upon clear channel identifying messages transmitted by said unlicensed remote site transceivers to said unlicensed master site transceiver in step (a2).

27. The method according to claim 26, wherein said communication control message broadcast by said unlicensed master site transceiver contains information representative of a sequence of respectively different ones of said clear channels as broadcast in step (a3) that are to be sequentially employed for conveying messages between said unlicensed master site transceiver and said unlicensed remote site transceivers.

28. The method according to claim 24, wherein step (b) comprises coupling identifications of said selected ones of said clear channels identified in step (a) to a modulated filter bank containing an inverse fast Fourier transform operator and a polyphase filter, and deriving therefrom a plurality of carrier frequencies respectively corresponding to said selected ones of said clear channels.

29. The method according to claim 28, wherein step (b) comprises causing said unlicensed master site and remote site transceivers to conduct communications therebetween by using differential quadrature phase shift keying modulation of sequential ones of

respectively different ones of said clear channels identified in step (a).

30. The method according to claim 24, wherein said prescribed communication bandwidth is the 217 to 220 MHz band, and wherein a respective sub-bandwidth channel is a 6.25 Khz wide channel.

31. The method according to claim 24, wherein step (b) comprises causing said unlicensed transceivers to conduct communications therebetween by sequentially using respectively different ones of said selected ones of said clear channels identified in step (a).